OPERATING INSTRUCTIONS

TYPE 1361-A

UHF OSCILLATOR

GENERAL RADIO COMPANY

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UHF OSCILLATOR

Form 1361-0100-C
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GENERAL RADIO COMPANY
WEST CONCORD, MASSACHUSETTS, USA

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This instrument requires an external power supply. Complete instructions for operation with General Radio power supplies are furnished with the appropriate supply.

WARNING

Other B supplies must be operated with the positive terminal grounded.

SPECIFICATIONS

Frequency Range: 450 to 1050 Mc.

Tuned Circuit: Butterfly, with no sliding contacts.

Frequency Accuracy: ±1%.

Warmup Frequency Drift: 0.2% maximum.

Frequency Control: A four-inch dial with calibration over 315°, with a slow-motion drive of about 8½ turns. Frequency scale is logarithmic, with vernier scale calibrated in 0.1% increments.

Output Power (into 50 ohms): At least 100 mw with Type 1267-A, 1264-A, (or 1201-C) Power Supply, 150 mw with the Type 1269-A (or Type 1203-B) Power Supply.

Output System: A coupling loop feeds a waveguide below cut-off attenuator calibrated over an 80-db range with 5-db scale divisions, relative attenuation. Additional uncalibrated range is provided. Output adjustment and locking Type 874 output connector are at the front of the instrument.

Modulation: An external audio-frequency plate modulator may be connected to the front panel MOD jack. The modulation impedance is approximately 6000 ohms. A sine wave of 35 volts rms amplitude will produce approximately 30% amplitude modulation. For 400- or 1000-cycle modulation the Type 1214-A Unit Oscillator is recommended. The Type 1263 Amplitude-Regulating Power Supply can be used for 1-kc square-wave modulation, the Type 1264-A Modulating Power Supply for square-wave or pulse modulation. Where minimum incidental fm is important, the Type 1000-P6 Crystal Diode Modulator or the Type 1000-P7 Balanced Modulator may be connected between the rf output connector and the rf load.

Power Supply: Four types of power supplies are recommended; the choice depends on the intended application. Refer to Table of Accessories, paragraph 1.5.

Tube: One 5675.

Mounting: Rack-bench cabinet.

Accessories Supplied: Type 874-R22LA Patch Cord, phone plug.

Other Accessories Available: Refer to paragraph 1.5.

Dimensions: Width 8, height 7-5/8, depth 9½ inches (205 by 195 by 240 mm), over-all.

Net Weight: 7 pounds (3.2 kg).

U. S. Patent No. 2,548,457 and 2,367,681.

General Radio Experimenter Reference: Vol 35, No. 3, March, 1961.

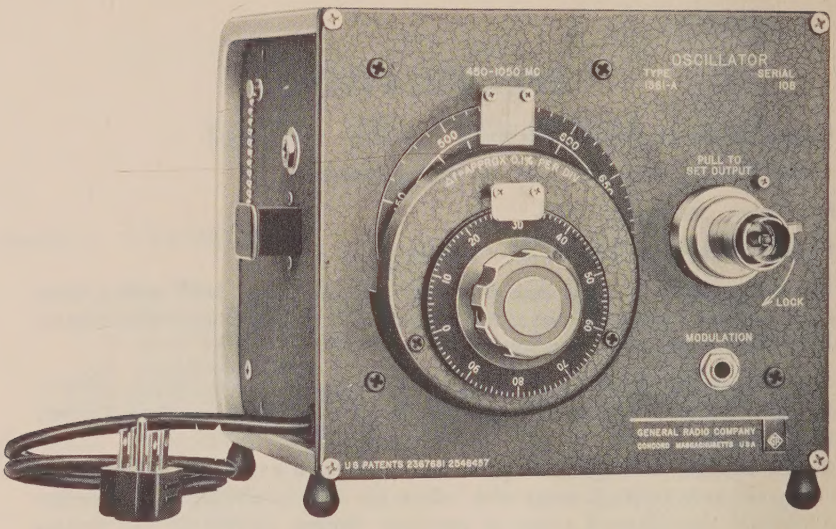
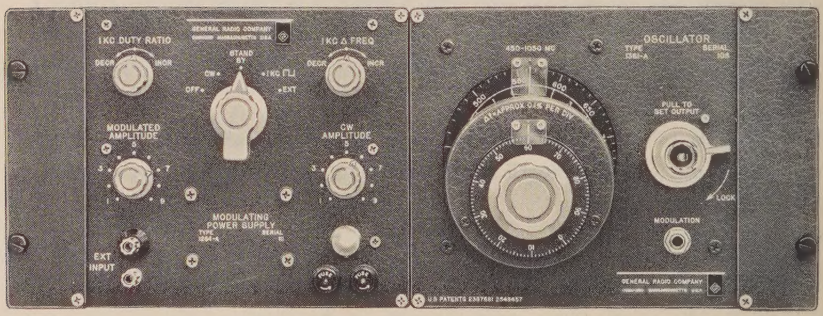


Figure 1-1. Panel view of the Type 1361-A Oscillator.



The Type 1361-A UHF Oscillator and the Type 1264-A Modulating Power Supply assembled with Type 481-P416 Adaptor Plate Set for rack mounting.

SECTION I INTRODUCTION

1.1 PURPOSE.

The Type 1361-A Oscillator (Figure 1-1) is a general-purpose oscillator for the radio-frequency laboratory. Covering the range from 450 to 1050 Mc, this oscillator can be used to drive bridges, slotted lines, impedance comparators, and other measuring equipment. Used with a voltmeter, it provides an accurately known output voltage for the testing of receivers. Direct sine-wave, square-wave, or pulse amplitude modulation is possible. Amplitude modulation free from incidental fm can be obtained with a single crystal-diode modulator over the frequency range from 0 to 5 Mc. Connected to a mixer, the oscillator can be used as the local oscillator in a heterodyne receiver to convert the Type 1216-A Unit I-F Amplifier or a low-frequency communications receiver into a detector for uhf signals. Pulsing and linear 100-percent amplitude modulation can be obtained with an external balanced modulator.

1.2 DESCRIPTION.

1.2.1 GENERAL. The tuning system of the Type 1361-A Oscillator is a butterfly circuit, which combines a variable air capacitor and a variable inductor in a single unit with no sliding contacts. Inductance varies from 0.0055μh at the low-frequency end of the tuning range to 0.0046μh at the high-frequency end, and capacitance varies from 22.5pf to 5.0pf. The vernier dial requires about 8 1/2 turns to rotate the main dial over its full 315 degrees. The rotor of the tuning unit is geared down for 70 degree rotation. The frequency calibration is accurate within 1 percent. The dial calibration is logarithmic over the range from 500 to 1000 Mc with a tuning rate of approximately 0.1% per vernier dial division. A turn-counting scale provided for use with the vernier dial permits accurate, unambiguous resettability. This feature is particularly valuable for the measurement of selectivity characteristics of receivers and other filter circuits.

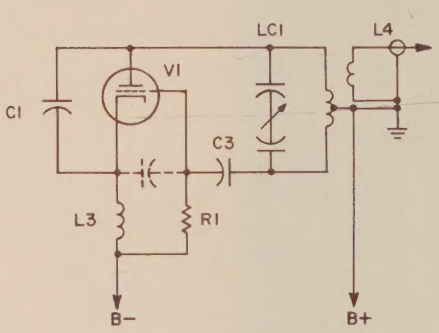


Figure 1-2. Elementary schematic diagram of the Type 1361-A Oscillator.

Plate and grid of the tube are connected to the tuned circuit (Figure 1-2), and the cathode is left floating. The oscillator circuit is of the Colpitts type, with feedback determined essentially by the electrode capacitances of the tube. A small amount of cathode-plate capacitance has been added.

1.2.2 OUTPUT SYSTEM. The output system is an adjustable coaxial line, with a coupling loop on one end and a Type 874 Coaxial Connector on the other. Coupling between the loop and the oscillator can be adjusted over a wide range, and the loop can be clamped in the desired position. Maximum power can be delivered to load impedances normally encountered in coaxial systems. The output line forms a waveguide-below-cutoff attenuator, calibrated over a range of 80-db. This range is approximately 15- to 95-db below the maximum power-output setting. Power available into a 50-ohm load is plotted against frequency in Figure 1-3 for a typical Type 1361-A Oscillator.

1.2.3 FREQUENCY STABILITY. For some applications a well regulated and filtered power supply should be used to avoid frequency variations caused by line-voltage fluctuation and to produce a clearer beat note at the highest frequencies. With an unregulated power supply, a line-voltage variation of 20 percent causes an instantaneous frequency change of about .007 percent at frequencies up to 750 Mc, and a frequency change of about .03 percent at the top end of the frequency range (1050 Mc). If a line-voltage shift of 20 percent is maintained for long enough to establish new conditions of thermal equilibrium, drifts as great as 0.1% may occur. Stability will be achieved within 5 minutes.

1.2.4 POWER REQUIREMENTS. The Type 1361-A Oscillator requires an external power supply. The choice among the four General Radio Power Supplies recommended in paragraph 1.5 should be based on the intended application of the oscillator. If a power supply other than one of those recommended is used, it should be capable of delivering 300 to 330 volts dc at 30 ma for the plate, and 6.3 volts at 0.135 ampere for the heater. The negative side of the power supply must be floating, since the positive side is grounded inside the oscillator.

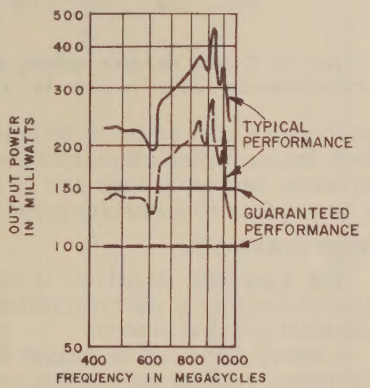
1.2.5 ACCESSORIES SUPPLIED. Supplied with the Oscillator are a Type 874-R22LA three-foot coaxial double-shielded Patch Cord, and a phone plug.

1.3 AMPLITUDE MODULATION.

1.3.1 GENERAL. Amplitude modulation permits increased detection sensitivity through the use of a tuned amplifier such as the General Radio Type 1232-A following the rf detector. Recommended modulators are described in paragraph 1.5.

1.3.2 SINUSOIDAL AMPLITUDE MODULATION. A jack on the front panel of the oscillator permits connection of a plate modulator, such as the Type 1214-A. This jack is also multipled on the left-hand side plate. Incidental fm is about 0.01% for 50% amplitude modulation at a carrier frequency of 450 Mc, and increases almost linearly with frequency to a value of 0.05% at 1050 Mc. The modulator must supply a dc path and must be able to carry 30 milliamperes dc. A sine wave of 35 volts rms amplitude will produce approximately 30% amplitude modulation.

Figure 1-3. Output power into a 50-ohm load for a typical Type 1361-A.



1.3.3 SQUARE-WAVE AMPLITUDE MODULATION. One-hundred-percent square-wave amplitude modulation (oscillator either off or operating at a fixed level) is accompanied by considerably less fm than is sinusoidal amplitude modulation. When operated with a Type 1263 Amplitude-Regulating Power Supply, the oscillator provides a levelled rf output of 20 milliwatts, cw or peak with 1-kc square-wave modulation, to a 50 ohm load.

1.3.4 PULSE AMPLITUDE MODULATION. The rise time, starting delay, and jitter of the Type 1361-A Oscillator depend on the frequency and load conditions. Typical values obtained with a Type 1217 Unit Pulse Generator used to drive the Type 1264-A Modulating Power Supply are shown in Figure 1-4.

1.3.5 ABSORPTION AMPLITUDE MODULATION. Amplitude modulation free from incidental fm can be obtained by connecting a crystal diode absorption modulator between the oscillator output and the equipment under test. With the Type 1000-P6 Crystal Diode Modulator, 30% amplitude modulation can be

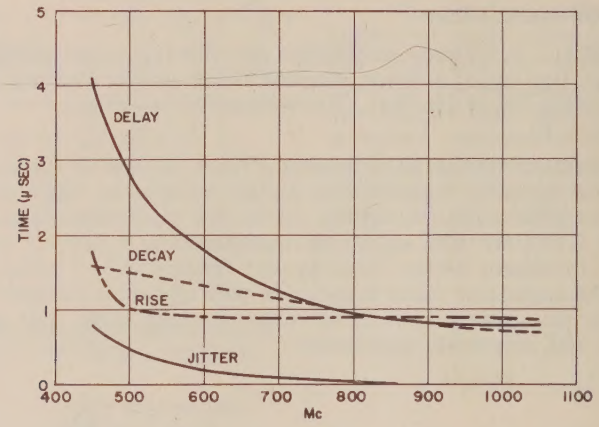


Figure 1-4. Typical rise time, starting delay, and jitter when the Type 1217 Unit Pulse Generator is used to drive the Type 1264-A Modulating Power Supply.

obtained with a peak output of 10 millivolts across 50 ohms. With the Type 1000-P7 Balanced Modulator, excellent pulse modulation with 60 db carrier suppression between pulses and 20 nanosecond rise time is possible. The peak rf output is 10 millivolts across 50 ohms.

1.4 SWEEP OPERATION.

The Type 1361 Oscillator is well suited for swept operation due to the use of ball bearings in the tuning drive mechanism and to the absence of sliding contacts in the rf circuit.

A sweep drive can be coupled either to the slow-motion dial or to the main frequency dial of the Oscillator. When the main frequency dial is coupled to the sweep drive, the sweep rate should be restricted to one excursion per second or less. The slow-motion dial can be driven at rates up to 5 cycles per second. The Type 1263-C Amplitude-Regulating Power Supply will maintain a constant rf output amplitude as the oscillator is swept.

When the Oscillator is driven by a sweep or dial drive, all moving parts in the oscillator must be lubricated in accordance with paragraph 4.6. For recommended dial drives, refer to paragraph 1.5.

1.5 AUXILIARY EQUIPMENT.

The Type 1361-A Oscillator can be used in conjunction with a variety of auxiliary General Radio equipment to build a signal–source system which is suited to specific requirements. Typical systems are shown in Figure 1-5.

Table 1 lists the accessories recommended for use with the Type 1361-A Oscillator. The choice of a recommended power supply, modulator, or sweep drive should be based on the intended application of the oscillator.

The Types 1263-C, 1264-A, 1267-A and 1269-A Power Supplies can be readily attached to the Oscillator to form a single unit for bench use or for relay-rack mounting with the listed adaptor plates. While electrically compatible, the Types 1201-C and 1203-B Power Supplies are difficult to combine physically with the oscillator.

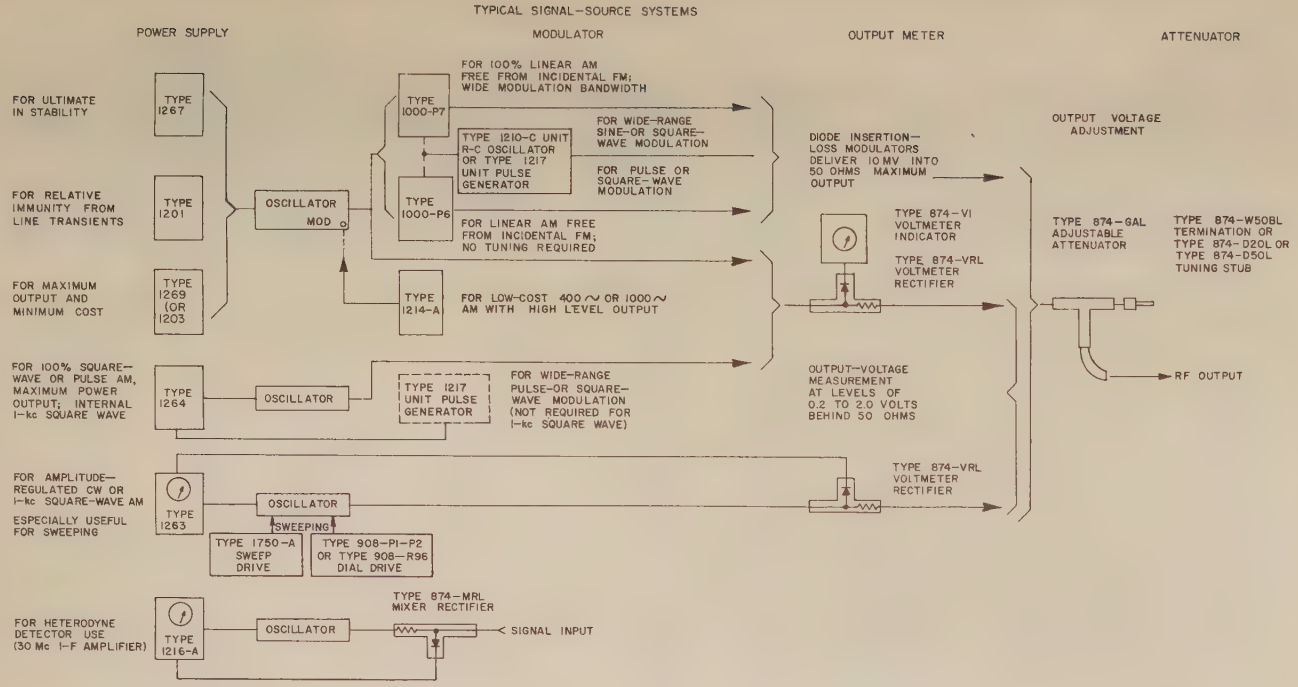
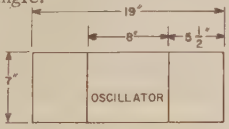
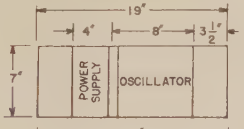
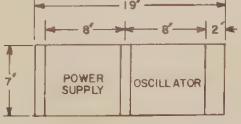

TYPICAL SIGNAL-SOURCE SYSTEMS
POWER SUPPLY
MODULATOR
OUTPUT METER
ATTENUATOR
FOR ULTIMATE IN STABILITY
TYPE 1267
FOR RELATIVE IMMUNITY FROM LINE TRANSIENTS
TYPE 1201
FOR MAXIMUM OUTPUT AND MINIMUM COST
TYPE 1269 (OR 1203)
OSCILLATOR MOD
FOR 100% LINEAR AM FREE FROM INCIDENTAL FM; WIDE MODULATION BANDWIDTH
TYPE 1000-P7
TYPE 1210-C UNIT R-C OSCILLATOR OR TYPE 1217 UNIT PULSE GENERATOR
FOR WIDE-RANGE SINE-OR SQUARE-WAVE MODULATION
FOR PULSE OR SQUARE-WAVE MODULATION
TYPE 1000-P6
FOR LINEAR AM FREE FROM INCIDENTAL FM; NO TUNING REQUIRED
TYPE 1214-A
FOR LOW-COST 400 ~ OR 1000 ~ AM WITH HIGH LEVEL OUTPUT
DIODE INSERTION-LOSS MODULATORS DELIVER 10 MV INTO 50 OHMS MAXIMUM OUTPUT
TYPE 874-VI VOLTMETER INDICATOR
TYPE 874-VRL VOLTMETER RECTIFIER
OUTPUT VOLTAGE ADJUSTMENT
TYPE 874-GAL ADJUSTABLE ATTENUATOR
TYPE 874-W50BL TERMINATION OR TYPE 874-D20L OR TYPE 874-D50L TUNING STUB
RF OUTPUT
FOR 100% SQUARE-WAVE OR PULSE AM, MAXIMUM POWER OUTPUT; INTERNAL 1-kc SQUARE WAVE
TYPE 1264
OSCILLATOR
TYPE 1217 UNIT PULSE GENERATOR
FOR WIDE-RANGE PULSE-OR SQUARE-WAVE MODULATION (NOT REQUIRED FOR 1-kc SQUARE WAVE)
OUTPUT-VOLTAGE MEASUREMENT AT LEVELS OF 0.2 TO 2.0 VOLTS BEHIND 50 OHMS
FOR AMPLITUDE-REGULATED CW OR 1-kc SQUARE-WAVE AM
ESPECIALLY USEFUL FOR SWEEPING
TYPE 1263
OSCILLATOR
SWEEPING
TYPE 1750-A SWEEP DRIVE
TYPE 908-P1-P2 OR TYPE 908-R96 DIAL DRIVE
TYPE 874-VRL VOLTMETER RECTIFIER
FOR HETERODYNE DETECTOR USE (30 Mc 1-F AMPLIFIER)
TYPE 1216-A
OSCILLATOR
TYPE 874-MRL MIXER RECTIFIER
SIGNAL INPUT

Figure 1-5. Typical signal-source systems built with a Unit Oscillator and associated equipment.

TABLE 1 - ACCESSORIES

Function	Instrument	Remarks
POWER SUPPLIES		
For best stability, freedom from line-voltage variations, and minimum residual fm.	Type 1267 Power Supply	Regulated dc plate and heater supplies.
For relative immunity from line transients.	Type 1201 Unit Power Supply	Regulated dc plate supply and ac heater supply.
For maximum output at minimum cost.	Type 1269 (or 1203) Power Supply	Filtered dc plate supply and ac heater supply, both unregulated.
For 100% square-wave or pulse amplitude modulation, and cw operation, and maximum power output.	Type 1264 Modulating Power Supply	Internal 1-kc square-wave generator.
For amplitude-regulated cw or 1-kc square-wave modulated output.	Type 1263 Amplitude-Regulating Power Supply	Leveled output of 20 mw into 50 ohms. Requires Type 874-VRL Voltmeter Rectifier.
For use as local oscillator in heterodyne detector system.	Type 1216 Unit I-F Amplifier	30-Mc center-frequency amplifier has calibrated attenuator and output meter. Use with Type 874-MRL Mixer Rectifier.
MODULATORS		
For pulse and square-wave modulation with little incidental fm.	Type 1263 Type 1264	See listing above.
For sinusoidal plate modulation at 400 and 1000 cps.	Type 1214-A Unit Oscillator	Provides 30% modulation.
Absorption modulation with no incidental fm.	Type 1000-P6 Crystal Diode Modulator	30% modulation; 10 mv peak rf output into 50 ohms. Requires modulation source.
Pulse modulation with excellent carrier suppression. Absorption modulation with no incidental fm.	Type 1000-P7 Balanced Modulator	100% modulation; 10 mv peak rf output into 50 ohms; 20-Mc modulation bandwidth. Requires modulation source.

Table 1 - Accessories (cont)

SWEEP DRIVES	The Type 1263-C Amplitude-Regulating Power Supply is recommended for use with all sweep drives.	
For automatic frequency sweep at 96° per minute.	Type 908-P1 Synchronous Dial Drive	Drive fits dial mechanism in place of knob. Adjustable stops that clamp on dial can be used to restrict range swept.
For automatic sweep at 720° per minute	Type 908-P2 Synchronous Dial Drive	
For automatic sweep at 144° per minute and provision for manual setting or drive.	Type 907-R144 Dial Drive	Potentiometer provides output sweep voltage proportional to dial position.
For adjustable sweep arc and speed.	Type 1750-A Sweep Drive	Magnitude and center position of sweep arc and the sweep rate are set by panel controls; provides horizontal deflection voltage proportional to shaft angle.
ADAPTOR PLATE SETS		
To rack-mount the oscillator alone.	Type 480-P408 Adaptor Plate Set	
To rack-mount the oscillator with a Type 1267-A or 1269-A Power Supply.	Type 481-P412 Adaptor Plate Set	
To rack-mount the oscillator with a Type 1263-C or 1264-A Power Supply.	Type 481-P416 Adaptor Plate Set	
COAXIAL ELEMENTS		
	See table at the rear of this manual.	
To convert from Type 874 to other coaxial systems.	Type 874-Q Adaptors	
To reduce standing-wave ratio on transmission lines.	Type 874-G Attenuators	
To reduce harmonic content of output from oscillator.	Type 874-F Filters	
For use in a heterodyne detector system.	Type 874-MRL Mixer Rectifier	Particularly useful with Type 1216-A Unit I-F Amplifier.
To provide monitored output level.	Type 874-VRL Voltmeter Rectifier	Use with Type 874-VI Voltmeter Indicator.

SECTION 2 OPERATING PROCEDURE

2.1 INSTALLATION.

2.1.1 CONNECTION TO POWER SUPPLY. The Type 1361-A Oscillator is shipped complete with tube installed, and is ready for use when connected to a suitable power supply. A cord and connector are supplied with the instrument for direct connection to a General Radio Power Supply. Refer to paragraph 1.5 for power-supply recommendations.

To connect the oscillator to the power supply, plug the oscillator power cable into the receptacle on the side of the power supply. When the Type 1263-C Amplitude-Regulating Power Supply is used, the small cable supplied with the Type 1263-C should be plugged into the telephone jack on the left-hand side of the oscillator and into the Type 1263-C. The dummy socket chained to the left-hand side of the cabinet should be inserted into the associated plug except for use with the Type 1264-A Modulating Power Supply, when the cable from the power supply is inserted.

2.1.2 BENCH MOUNTING. The Type 1263-C, 1264-A, 1267-A, or 1269-A Power Supply can be rigidly attached to the left-hand side of the oscillator. The power cables are coiled between the cabinets and end frames. To attach the units, proceed as follows:

1. Remove the dust covers from both instruments.

2. Remove the rubber feet from the right-hand side of the power supply and from the left-hand side of the oscillator.

3. Coil the power cables and plug them in as required. (For the Type 1264-A Modulating Power Supply, detailed connection information is given in the Type 1264-A instruction book.)

4. Slip the long 10-32 screws supplied with the power supply through the matching holes near the rear on the side plates of the instruments, starting them through the oscillator side and engaging the nuts on the power-supply side. For the Types 1263-C and 1264-A Power Supplies, there is an additional pair of matching holes near the front of the instruments, which may also be secured with the screws provided.

5. Secure the front panels of the oscillator and power supply by means of the adaptor kit furnished with the power supply. Complete assembly instructions are packed with the kit.

2.1.3 RELAY-RACK MOUNTING. To rack mount the oscillator by itself, a Type 480-P408 Adaptor Plate set is required. To rack mount the oscillator attached to a Type 1267-A or 1269-A Power Supply, a Type 481-P412 Adaptor Plate Set is required. To rack mount the oscillator attached to a Type 1263-C or 1264-A Power Supply, a Type 481-P416 Adaptor Plate Set is required. Detailed assembly and installation instructions are packed with each kit.

2.1.4 MODULATOR CONNECTION. For sinusoidal amplitude modulation the audio modulation voltage should be inserted at the MOD jack on the front panel. Full plate current must flow through the modulating source. A modulation voltage of about 35 volts is required for 30-percent modulation. The input impedance is about 6000 ohms. The Type 1214-A Unit Oscillator is an economic 400- and 1000-cycle modulator for the Oscillator.

2.1.5 RF OUTPUT CONNECTIONS. With the Types 1201-B, 1264-A, 1267-A, or 1269-A Power Supply, the oscillator rf output may be connected directly to the equipment under test by means of the three-foot coaxial cable supplied.

Attenuator pads may help to reduce standing waves on the cable where the equipment under test does not provide a good termination. Without padding, cable resonance effects may be quite pronounced since the output coupling loop of the oscillator is not a matched source. A low-pass filter may be beneficial in cases where oscillator harmonics must be kept to very low values.

When the Type 1263-C Amplitude-Regulating Power Supply, is used the oscillator rf output should be connected directly to the short cross arm of a Type 874-VRL Voltmeter Rectifier. The longer cross arm output labelled "R" contains a 50-ohm series resistor which is the effective generator source impedance. The levelled rf output availabel at the "R" connector may now be connected to the equipment under test. The rectified output available from the stem of the rectifier should be connected to the front panel connector of the Type 1263-C labelled "OUTPUT RECTIFIER" by means of a Type 874-R22LA Patch Cord.

If cables equipped with military connectors are to be used, a suitable adaptor may be semipermanently attached to the locking Type 874 output receptacle of the oscillator. See the table at the rear of this book for a listing of available adaptors.

2.2 OPERATION.

After turning on the power supply, adjust the frequency by means of the frequency dial. Maximum output is obtained with the attenuator barrel pushed all the way in. To reduce output, pull the attenuator out. The output lock is actuated by clockwise rotation. The output attenuator is calibrated at 5-db intervals over an 80-db range, except for the region near maximum output. Load reaction on the oscillator frequency will be negligible for adjustments of load or attenuator when you are operating in the calibrated region of the attenuator, but padding (refer to paragraph 2.1.5) may still be desirable to reduce standing waves in the rf output cable.

SECTION 3 APPLICATIONS

3.1 GENERAL.

The versatility of the Type 1361-A Oscillator is greatly increased by the large selection of Type 874 coaxial elements, available from General Radio Company. These elements are part of a complete, integrated line of equipment for measurements of voltage, power, and standing-wave ratio at very-high and ultra-high frequencies. Use of the coaxial elements can adapt the oscillator to various applications in the radio-frequency laboratory in place of more expensive equipment that is not always available. The tuning circuit of the Type 1361-A uses ball bearings and thus can be motor-driven, for sweep applications, by sweep and dial drives (refer to paragraphs 1.4 and 1.5).

Five applications are described in detail in the following paragraphs. Others will be suggested by a study of the complete list of Type 874 coaxial elements, included in the General Radio catalog. Coaxial elements with locking connectors should be used. A condensed list of Type 874 elements appears in the rear of this manual.

3.2 OSCILLATOR AS SIGNAL GENERATOR FOR RECEIVER TESTING.

The Type 1361-A Oscillator, as a well shielded power source, can be used as a signal generator to test receivers if means are available to measure the output. The Type 874-VRL Voltmeter Rectifier and the Type 874-VI Voltmeter Indicator are suitable for this purpose, and should be connected to the oscillator as shown in Figure 3-1.

The output coupling system of the Type 1361-A Oscillator is calibrated in decibels. At 0-db output setting, the output is measured by a crystal diode in the voltmeter rectifier and indicated on the meter of the voltmeter indicator. Means are provided to standardize the crystal indication. A 50-ohm resistor after the crystal determined the output impedance.

With the above-described arrangement, the maximum available output is several tenths of a volt. The attenuator calibration covers 80 db. Shielding of the oscillator and of other components is adequate for accurate measurements over this range.

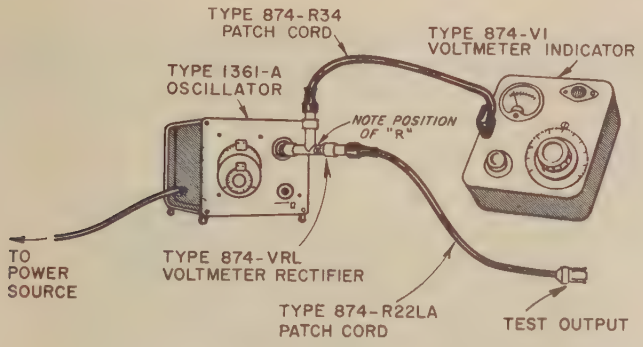


Figure 3-1. Setup of the oscillator and accessories for use as a standard-signal generator.

3.3 OSCILLATOR AS A TELEVISION SIGNAL GENERATOR.

Used in combination with a Type 1000-P6 Crystal Diode Modulator and a Type 874-G20 20-db Fixed Attenuator, the oscillator is a convenient source of television signals over its entire carrier-frequency range if video modulating voltage is available (see Figure 3-2). The modulating voltage required can be obtained from a standard television receiver tuned to the local channel.

Since the modulator and oscillator are separated from each other by an attenuator pad, amplitude modulation is free from incidental fm. Output is about 10 millivolts.

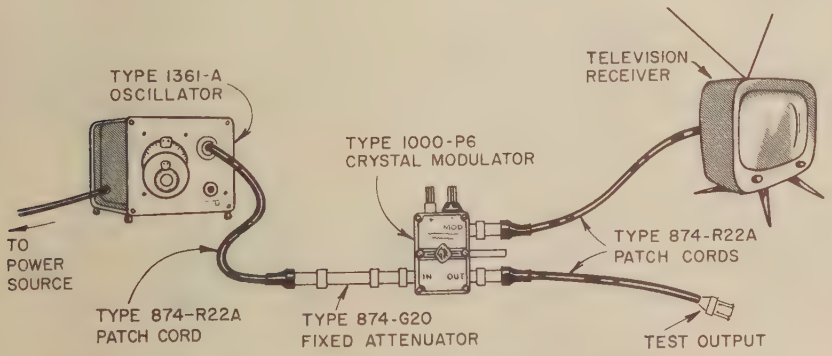


Figure 3-2. Setup of the oscillator with a video modulator for use as a television signal generator.

3.4 LOCAL OSCILLATOR IN A FREQUENCY CONVERTER.

Connected to a Type 874-MRL Mixer Rectifier, the Oscillator can provide the local signal in a heterodyne converter to adapt the Type 1216-A Unit I-F Amplifier for use as a sensitive detector for uhf signals (see Figure 3-3). Without additional tuning, the conversion loss is about 6-db at an interme-

diate frequency of 30 Mc. The Type 1216-A I-F Amplifier has a built-in precision attenuator and a panel meter. Its bandwidth is 0.7 Mc and it has excellent sensitivity. Provision is made for the measurement of the rectified mixer current in the i-f amplifier, and a separate built-in power supply is available for operating the oscillator.

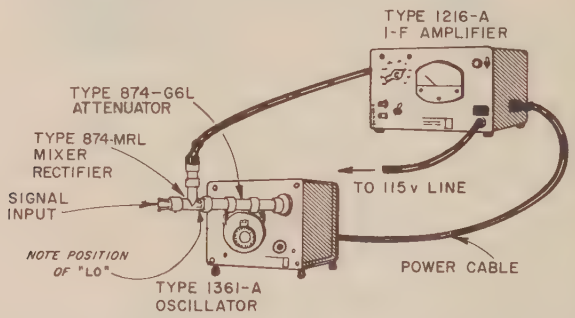


Figure 3-3. Setup of the oscillator and a mixer rectifier for use as a frequency converter.

3.5 OSCILLATOR AS A TRANSFER OSCILLATOR.

The oscillator can be used as a transfer oscillator to measure the frequency of a microwave source, or as a heterodyne frequency meter of limited accuracy.

Auxiliary equipment required, in addition to a power supply, includes a Type 1232-A Amplifier, a Type 874-VRL Voltmeter Rectifier, a Type 874-G10L pad, a Type 874-R22A patch cord, and two patch cords such as Type 874-R22LA for connection to the signal source and frequency-measuring equipment. The necessary connections are shown in Figure 3-4.

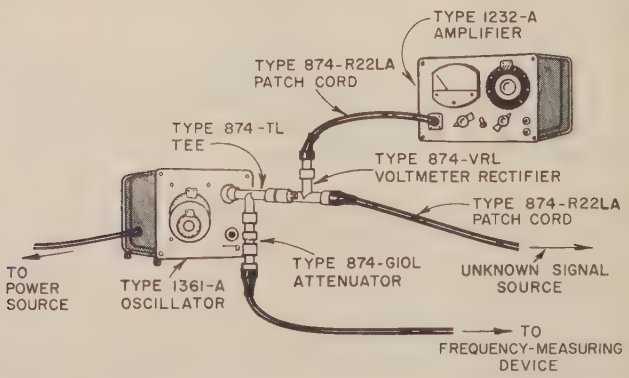


Figure 3-4. Setup of the oscillator and accessories for frequency measurement.

The oscillator should be tuned to zero beat with the source at two or more points on the dial, noting the frequencies of a pair of successive, strong beats. The harmonic order can then be determined as follows:

Let: f_s=the source frequency

f_h=the higher frequency of two successive, strong beats

f_ℓ=the lower frequency of two successive, strong beats

$f_d = f_h - f_\ell$ =the difference between these two frequencies

$H = f_h / f_d$ (always an integer)

and the signal frequency, f_s, is:

$$f_s = Hf_\ell = (H-1)f_h$$

3.6 USE AS A SWEPT OSCILLATOR.

The Type 1361-A oscillator employed in the equipment setup shown in Figure 3-5, can be used for rapid insertion-loss measurements on uhf devices. This is indicative of a number of applications in which the oscillator can be operated in a swept-frequency mode.

Use of the Type 1263-B Power Supply (which includes the Type 874-VRL Voltmeter rectifier) ensures a leveled output from the oscillator throughout the sweep range. The internal 1-kc square-wave modulator of the power supply permits use of the extremely sensitive Type 1232-A Tuned Null Detector as the indicator, with an auxilliary output that can drive an X-Y recorder, if desired.

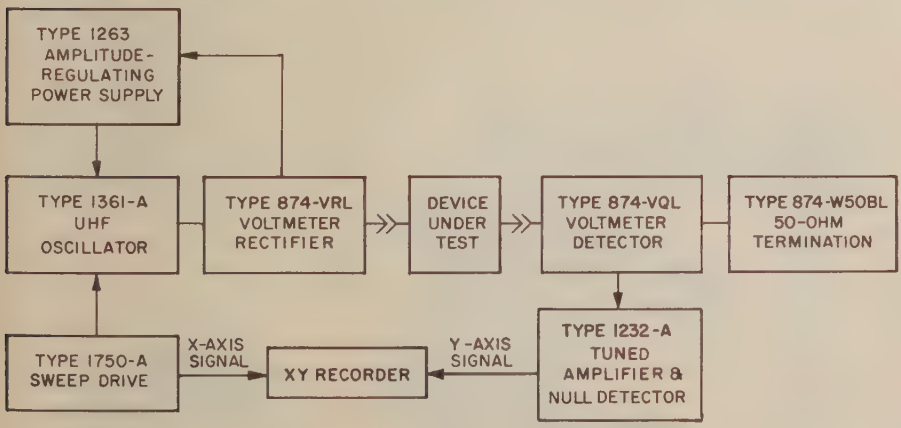


Figure 3-5. Set up utilizing a Type 1361-A oscillator for insertion-loss measurements.

SECTION **4**

SERVICE AND MAINTENANCE

4.1 WARRANTY.

We warrant that each new instrument sold by us is free from defects in material and workmanship, and that, properly used, it will perform in full accordance with applicable specifications for a period of two years after original shipment. Any instrument or component that is found within the two-year period not to meet these standards after examination by our factory, district office, or authorized repair agency personnel, will be repaired, or, at our option, replaced without charge, except for tubes or batteries that have given normal service.

Normal life of the type-5675 tube is considered to be 400 hours or 6 months; replacements for defective tubes will be made on a prorated basis within this period.

4.2 SERVICE

The two-year warranty stated above attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers will assist in any way possible. If the difficulty cannot be eliminated by

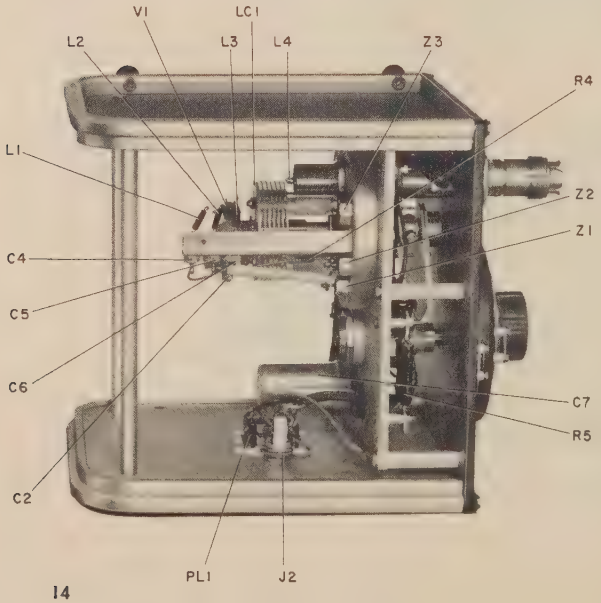


Figure 4-1. Interior view of Type 1361-A oscillator with shield can and cover removed.

use of the following service instructions, please write or phone our Service Department (see rear cover), giving full information of the trouble and of steps taken to remedy it. Be sure to mention the serial and type numbers of the instrument.

4.3 INSTALLATION OF OSCILLATOR TUBE.

When it is necessary to replace the type-5675 oscillator tube, install the new tube as follows (see Figures 4-1 and 4-2):

a. Loosen the screws at the rear of the cabinet and pull the cover free.

b. Remove the small screw at the top of the shield can, loosen the screw that holds the clamping band, and then remove the shield can carefully.

c. Disengage the cathode connection by pushing the clip supporting the two teflon-insulated wires (that form the feedback capacitor C1) toward the butterfly.

d. Pull the tube socket free, being careful not to disturb the heater and cathode chokes.

e. Remove the tube by swinging the cathode end upward.

f. To install the new tube, follow steps a through e in reverse order. Be sure that the plate of the tube is squarely seated in the plate support block. Failure to seat the tube properly may seriously reduce the maximum frequency to which the oscillator can be tuned. Lift grid clips upward to ensure full seating of grid. This may be accomplished by means of a small screwdriver slipped between the plate that supports the grid clips and the butterfly plate. Make sure that no shorts exist between heater (or heater and cathode) leads; do not disturb the orientation of the associated chokes. When installing the shield can, be sure to replace the small screw that secures it to the internal angle-bracket to prevent holes in the output at certain frequencies.

4.4 FREQUENCY CALIBRATION (Figure 4-1).

Replacement of the oscillator tube may affect the frequency calibration. To restore calibration, rotate trimmer capacitor C2 to make the output frequency agree with the dial indication at 1050 Mc. Before adjusting the trimmer capacitor, allow the instrument to warm up, since warm-up drift may be as much as 0.2 percent. Also, set the OUTPUT attenuator to 10 db to avoid frequency pulling by the load. The oscillator shield should be in place during

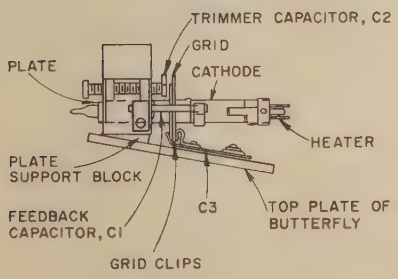


Figure 4-2. Details of the oscillator-tube mounting.

this adjustment. The trimmer is accessible through the shield can when the large screw on the side of the can is removed. There is no dc on the trimmer shaft.

4.5 POWER OUTPUT CHECK.

To check the available output of rf power from the oscillator, connect a thermistor-bridge power meter to the output connector. Use an intermediate pad, such as a Type 874-G10L Attenuator, to reduce power to a level that can be accepted without damage to the thermistor element. The oscillator output attenuator should be pushed in all the way to the stop and locked in this position. Power output as a function of frequency can now be measured, merely by adjustment of the frequency control. Refer to Figure 1-3 for guaranteed and typical performance with various General Radio power supplies.

4.6 OPERATING CHECK.

To check dc operating conditions, plug a dc milliammeter into either MODULATION jack (J1 or J2) and measure the plate current of V1. Oscillation of V1 is indicated by a variation of the plate current as the oscillator is tuned over its frequency range. Maximum plate current normally occurs near the high end of the range and should be 25 to 30 ma for CW operation with a 300-volt power supply.

The resistances to ground from each terminal of V1, measured with the power off, PL1 plugged into SO1, and the PL2 terminals shorted together, are as follows:

Plate: 0 ohm
Grid: 7600 ohms
Cathode: 5600 ohms
Heaters: Less than 1 ohm.

Test voltages are given on the schematic diagram, Figure 4-3.

4.7 LUBRICATION.

When the Type 1361-A Oscillator is driven by a sweep or dial drive, all moving parts must be properly lubricated. Proper lubrication includes an occasional drop of light oil at the ball bearings, and occasional relubrication of the pinion gear in the dial assembly.

PARTS LIST

REF NO.	DESCRIPTION	PART NO.
R1	RESISTOR, Film 2kΩ ±5% 1/2w	6610-0250
R2	RESISTOR, Film 470Ω ±5% 1/4w	6610-2300
R3	RESISTOR, Film 470Ω ±5% 1/4w	6610-2300
R4	RESISTOR, Composition 33Ω ±5% 1/2w	6100-0335
R5	RESISTOR, Power 5.6kΩ ±10% 10w	6630-2569
R6	RESISTOR, Composition 1MΩ ±5%	Part of 1361-0410
C1A C1B	CAPACITOR	Built-in
C2	CAPACITOR	Built-in
C3	CAPACITOR	Built-in
C4	CAPACITOR, Ceramic 100pf 500dcwv	4400-1700
C5	CAPACITOR, Ceramic 100pf 500dcwv	4400-1700
C6	CAPACITOR, Ceramic 100pf 500dcwv	4400-1700
C7A C7B	CAPACITOR, Electrolytic 10μf 450dcwv	4450-0300
J1	JACK, Phone	4260-0400
J2	JACK, Phone	4260-0400
L1	CHOKE, Air 4.3μh	4290-4550
L2	CHOKE, Air 4.3μh	4290-4550
L3	CHOKE, Air 0.16μh	4290-3800
LC1	BUTTERFLY CAPACITOR	
PL1	PLUG	4220-4600
PL2	PLUG	1361-2060
SO1	SOCKET	1361-0410
V1	TUBE, Type 5675	8380-5675
Z1	FILTER, 2500pf GMV	5280-0100
Z2	FILTER, 2500pf GMV	5280-0100
Z3	FILTER, 200pf ±20%	5280-0400

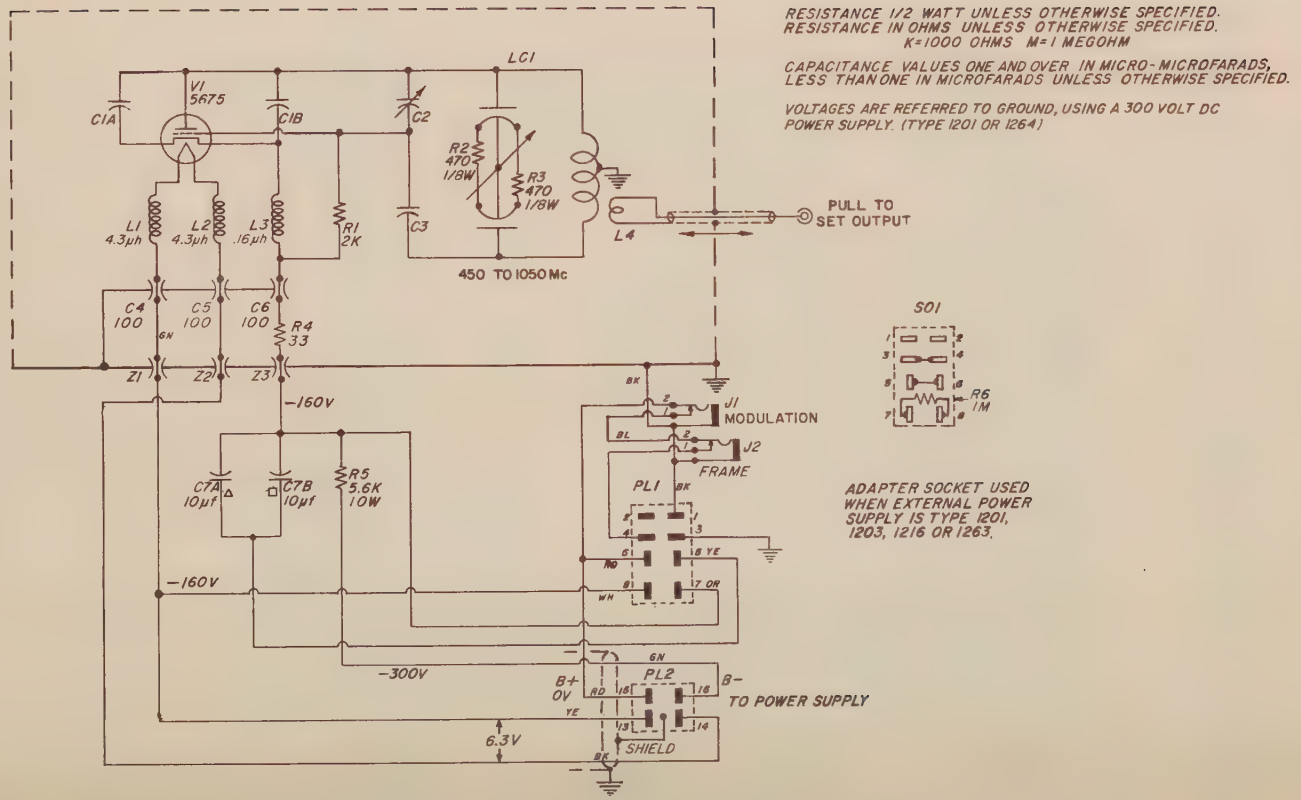


Figure 4-3. Schematic diagram of Type 1361-A Oscillator.

ACCESSORY EQUIPMENT

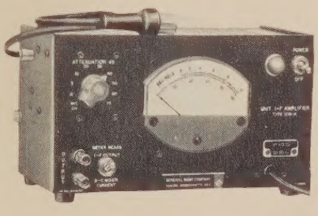
TYPE 1267-A REGULATED POWER SUPPLY

Regulated heater and plate supplies provide freedom from line-voltage variations and minimum residual fm. Attaches readily to the oscillator.

Two models available:
Type 1267-A (for 115-v operation).
Type 1267-AQ18 (for 230-v operation).

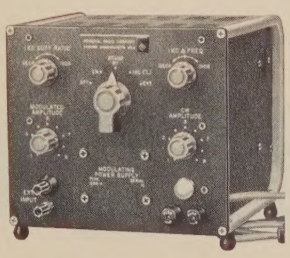
TYPE 1269-A POWER SUPPLY

A general-purpose power supply with filtered dc plate supply and ac heater supply (both unregulated). Attaches readily to the oscillator. Can be operated from 115-v or 230-v supply.



TYPE 1216-A UNIT I-F AMPLIFIER

In a heterodyne system, this 30-Mc center-frequency amplifier, which includes a calibrated attenuator and output meter, can be used with the Type 874-MRL Mixer Rectifier as the detector. The amplifier also supplies plate and heater power to the heterodyning oscillator. Can be operated from 115-v or 230-v supply.

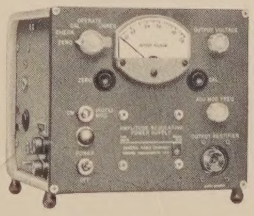


TYPE 1264-A MODULATING POWER SUPPLY

Provides 100% pulse and square-wave modulation and can also be used as a source of adjustable, well-regulated, plate power and unregulated heater power. Attaches readily to the oscillator. Can be operated from 115-v or 230-v supply.

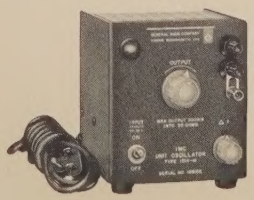
TYPE 1263-C AMPLITUDE-REGULATING POWER SUPPLY

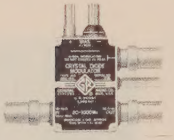
For amplitude-regulating cw or 1-kc square-wave modulated output. Maintains oscillator output at a preset value in spite of frequency, load, and line-voltage variations. Particularly useful when the oscillator is mechanically driven. Attaches readily to the oscillator. Can be operated from 115-v or 230-v supply.



TYPE 1214-A UNIT OSCILLATOR

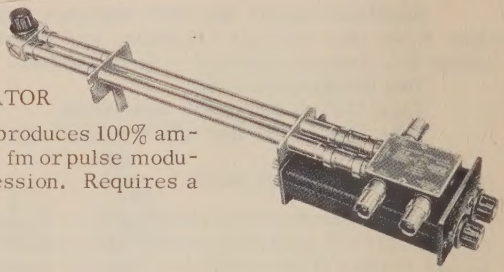
This compact and inexpensive Unit oscillator can be used to provide sinusoidal plate modulation at 400 and 1000 cps. Operates from 115-v supply.





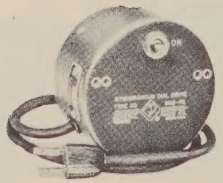
TYPE 1000-P6 CRYSTAL DIODE MODULATOR

This insertion-loss modulator produces fm-free 30% amplitude modulation. Requires a modulation source.



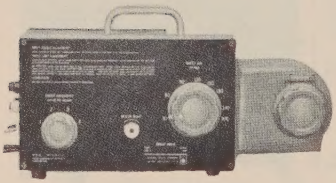
TYPE 1000-P7 BALANCED MODULATOR

This insertion-loss modulator produces 100% amplitude modulation with no incidental fm or pulse modulation with excellent carrier suppression. Requires a modulation source.



TYPE 908 DIAL DRIVES

These drives install directly in place of the knob on the oscillator dial for automatic frequency sweep. Stops are adjustable and the drives reverse automatically. The Type 908-P1 sweeps the oscillator at 96° per minute and is recommended for use with a graphic recorder: the Type 908-P2 sweeps at 720° per minute and is recommended for oscilloscopic displays; the Type 907-R144, which has provision for manual setting or drive and provides a sweep voltage proportional to the angle of rotation, sweeps at 144° per minute and is recommended for use with an XY recorder.



TYPE 1750-A SWEEP DRIVE

This drive attaches to the knob on the oscillator dial for automatic frequency sweep. It provides a horizontal deflection voltage proportional to shaft angle. It offers an adjustable sweep arc, adjustable center position of the arc, and adjustable sweep speed. A blanking circuit eliminates the oscilloscope return trace and produces a base line.

Two models available:
Type 1750-A (for 115-v operation).
Type 1750-AQ18 (for 230-v operation).

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